TOYOTA

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October 16, 2001

By Hand

14457

The Honorable Jeffrey W. Runge, M.D.
Administrator
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Dear Dr. Runge:

NHTSA-01-8816-6

Re.: Petition for Expedited Rulemaking; Federal Motor Vehicle Safety Standard No. 208, *Occupant Crash Protection*

The attached petition for rulemaking is submitted on behalf of Toyota Motor Corporation, pursuant to 49 CFR Part 552. In order to assure the timely and orderly implementation of the "advanced air bag" requirements as found in 65 Federal Register 30680 (May 12, 2000) and to allow the development of advanced air bag systems that can help further improve protection for the largest numbers of occupants, expedited action by the agency on this petition is requested. We would request action by the agency either granting or denying this petition by November 16, 2001.

Should NHTSA have any questions regarding this petition for rulemaking, please contact Ms. Christina Primavera of my staff at (202) 463-6854.

Sincerely,

Christopher Tinto, Director
Toyota Motor North America, Inc.

Cc: Mr. Steve Kratzke, NHTSA Safety Performance Standards
Mr. Robert Shelton, NHTSA Safety Performance Standards

4595
ES2001/01595

Toyota Petition for Expedited Rulemaking

Toyota would first like to commend NHTSA (the 'Agency') for their efforts to promote advanced air bag technologies, with the goal of improving the protection of small-statured occupants, while reducing the risk of injury to at-risk occupant populations. While the intentions of the May 12, 2000 FMVSS 208 interim final rule are commendable, there are serious concerns that systems designed to meet the requirements of this rule may have unintended, negative real-world consequences.

The rule places strict limitations on the design of vehicle air bag systems. These limitations, coupled with the limited current technological readiness of advanced air bag systems, will produce real-world side effects that are of serious concern to manufacturers. These concerns involve Occupant Classification System capabilities, Low Risk Deployment system limitations, and the testing procedure for these systems. In this regard, Toyota supports the October 16, 2001 Alliance of Automobile Manufacturers' (the 'Alliance') petition for changes to the provisions of FMVSS 208. However, in addition to those issues already addressed by the Alliance, Toyota hereby petitions NHTSA for rulemaking on FMVSS 208 to allow a 3-Way Manual Override Switch in all vehicles with advanced air bags.

Background – Suppression Systems

As described in individual manufacturers' recent meetings with the Agency, FMVSS 208 requirements present a number of challenges for vehicle designers. Although systems exist which have demonstrated an ability to "comply" with the technical requirements of FMVSS 208 in a laboratory test environment under tightly controlled test conditions, manufacturers continue to have serious concerns with the ability of Occupant Classification Systems (OCS) to adequately characterize all real-world situations.

To illustrate this point, figures 1-4 demonstrate the relationship between occupant weight and sensor output for a typical suppression technology. As evidenced by figure 1, in a compliance regimen, a theoretical threshold can be determined which would suppress the airbag for the 6YO dummy, while deploying the airbag for the 5th female dummy. For the typical system shown, this threshold would be in the vicinity of 380 N of sensor output, which would also take into account the sensors inherent ±50N gray zone. This setting would in essence insure that in most cases, the 5th female *dummy* would get an airbag, whereas the 6YO *dummy* would not.

However, figure 2 better illustrates our real world concerns. Testing with human test subjects shows that many small statured adults with small, but common variances in seating position (figure 3) will actually be found inside the sensor's gray zone, unlike the 5th female dummy surrogate. In this case, a reliable airbag deployment cannot be assured, and in fact, in many cases, the airbag will be suppressed. The net result is an increased risk to the small statured adult population, essentially shifting the risk group away from the out-of-position (OOP) child to the small statured adult (primarily female), even those adults that are properly belted. We strongly believe that this is an unacceptable trade off.

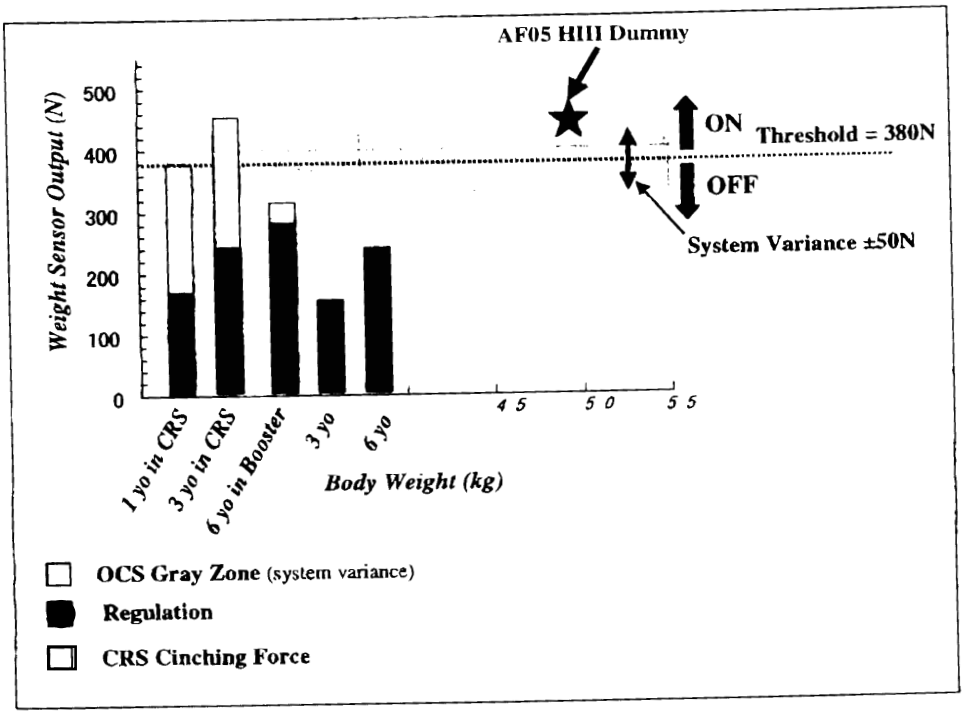


Figure 1

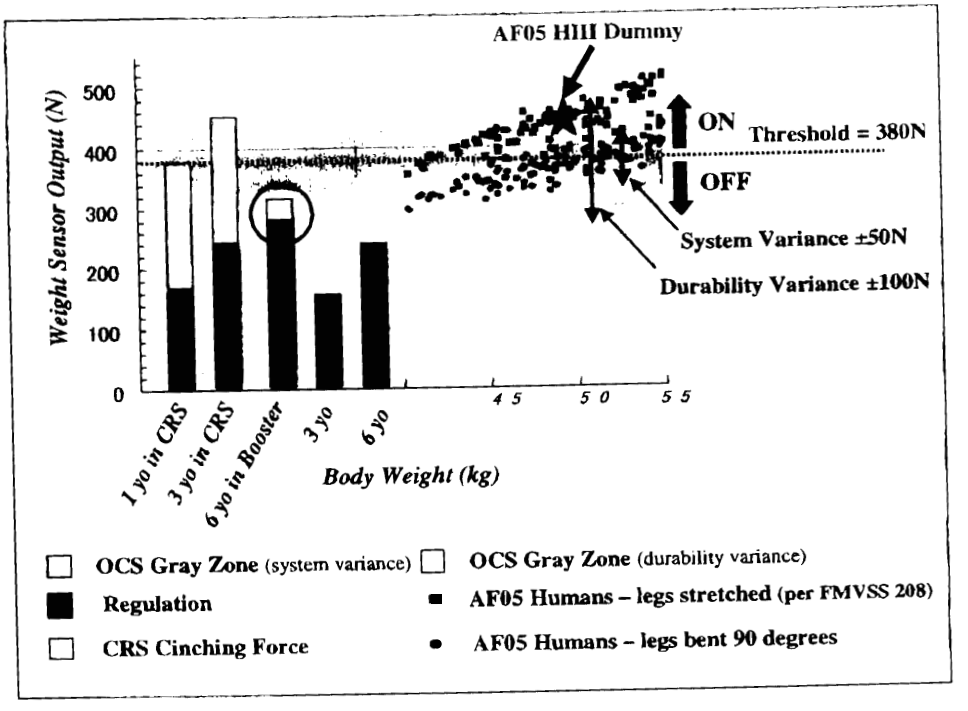


Figure 2

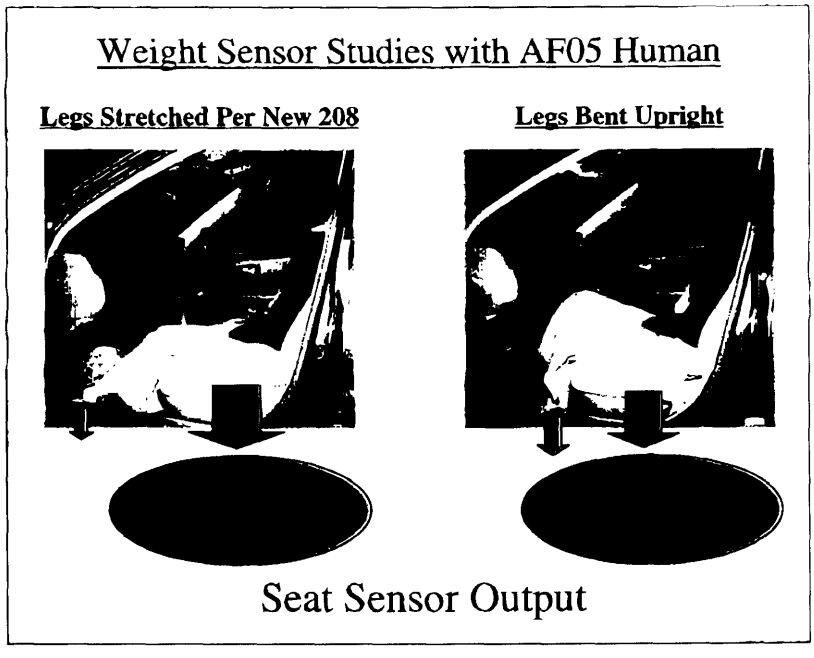


Figure 3

According to FMVSS 208, adults should always receive an air bag while children below age 12 should never receive an air bag. Although use of a suppression system could be considered "directionally correct" to satisfy the requirements, there can be no assurance that the system will perform appropriately in all instances, and *may in fact increase risk to a large portion of the motoring public* (i.e. small statured adults, most of which being small females).

(An important point to add is that durability and aging testing have determined that the gray zone of the OCS increases over time by roughly 100%, in this case to approximately ±100N (shown as "durability variance" in figures 2 and 4). This of course compounds the problem of an incorrect suppression /deployment decision being made by the OCS as the vehicle ages.)

To countermeasure the real world problem of potentially suppressing the airbag for a large portion of the motoring population, manufacturers may then choose to drop the threshold of the sensor output to insure deployment occurs for all adults (Figure 4). However, as illustrated by the graph, in this case the airbag is no longer reliably suppressed for the 6YO child, and in fact, will in many cases deploy for larger and older children. This of course defeats the very purpose of the suppression system, which was intended to suppress the airbag for child occupants.

We note that the General Accounting Office (GAO) on advanced airbags also raised similar concerns in its recent report to Congress. For more information see "Vehicle Safety: Technologies, Challenges, and Research and Development Expenditures for

Advanced Air Bags," Report to the Chairman and Ranking Minority Member, Committee on Commerce, Science, and Transportation, US Senate, United States General Accounting Office, GAO-01-596, June 2001.

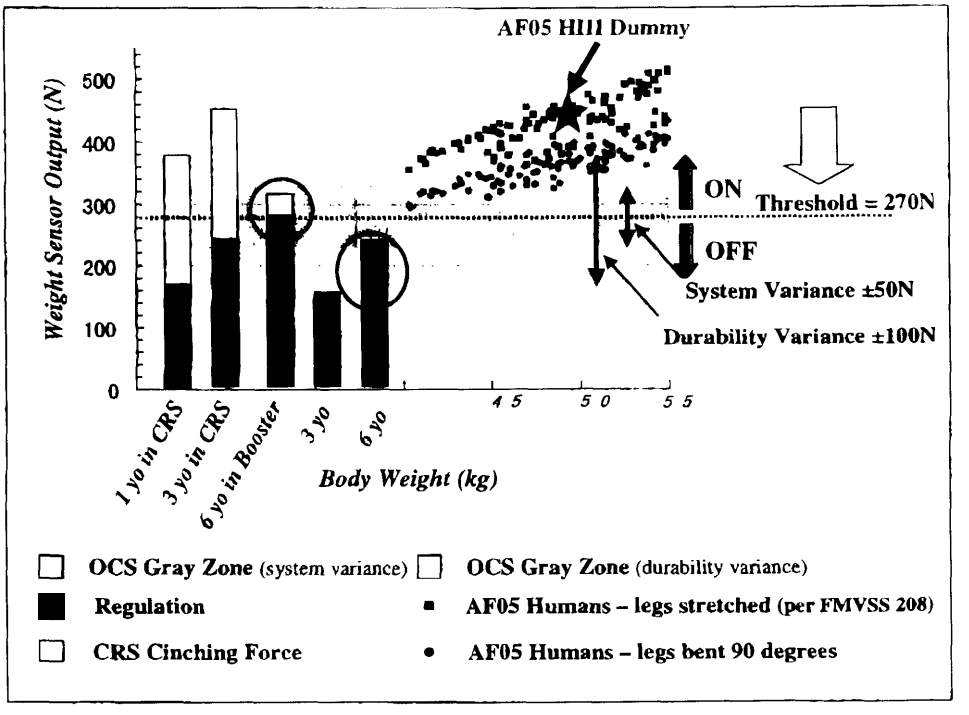


Figure 4

3-Way Manual Override Switches

Therefore, given our serious concerns for limitations inherent in current technology in the real world, we strongly believe customers should have the ability to override incorrect "decisions" made by the suppression system, which would be clearly indicated by the telltale lamp, should s/he be uncomfortable with the system determination for airbag deployment or suppression. We therefore petition NHTSA to permit manufacturers, at their discretion, to install a 3-Way Manual Override Switch (as illustrated in figure 5).

It is important note that we are not requesting that the Agency *mandate* 3 way switches, nor are we asking that the Agency allow alternative certification to the suppression requirements through their use. Instead, we are asking that the Agency *permit* installation of these switches as a redundant feature to the OCS, in *all* passenger cars, SUVs, and light duty trucks with advanced airbag systems, which we believe would help to address real world concerns with potentially erroneous OCS function.

The 3-Way Manual Override Switch ("switch") consists of three operating positions: "ON", "AUTO", and "OFF". The consumer would always be aware of the deployment status of the air bag by a telltale indicator, illuminating either the "ON" or "OFF" light

for the bag. If the consumer chooses the "ON" position, then s/he would be confident that the air bag would always fire based on crash severity. In this case, the telltale

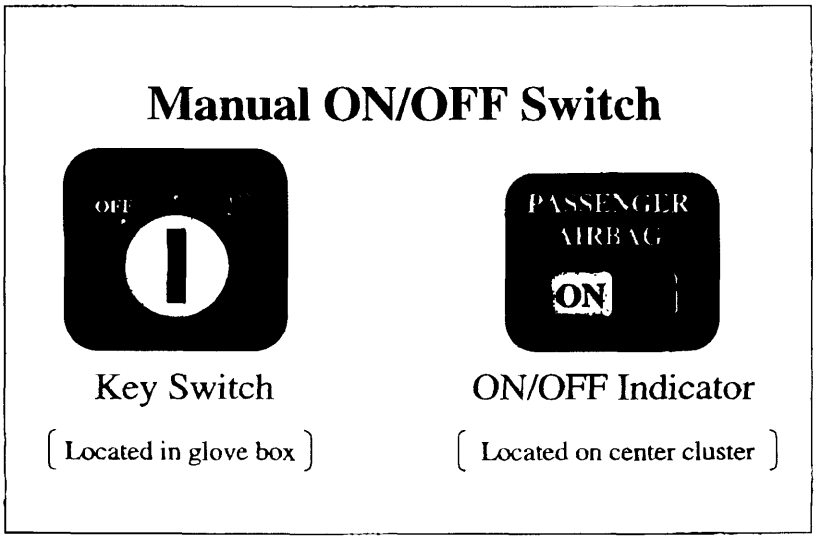


Figure 5

would read "ON" at all times. However, if "OFF" is chosen, then the air bag is completely deactivated and would not fire under any conditions. This would conversely cause the telltale to read "OFF" at all times. Finally, if "AUTO" is chosen, then the OCS will be employed to make its decision and the system will deploy, or suppress the bag according to occupant size and crash severity.

Accordingly, the telltale would illuminate either "ON" or "OFF" depending on the decision of the OCS. This same telltale indication would be what prompts the consumer to override the system (i.e., if a child in a CRS needs suppression or a small adult needs a bag). In any case, the consumer can make an informed decision based on the reading of the telltale and the occupant of the passenger seat.

Agency Position Regarding Current Airbag On-Off Switches and "Misuse"

As explained above, the redundancy provided by the switch alleviates real-world concerns by giving added insurance that the correct decision is made. Further, the real-world uncertainties of technology capabilities necessitate this type of redundancy. Although manufacturers have confidence in the purpose and function of this override switch, recent publications by the Agency indicate a concern regarding the misuse of such switch. However, there appears to be a critical disconnect between what the Agency considers "misuse" and the air bag function dictated by the requirements of FMVSS 208.

In the July 2001 report [DOT HS 809 306] entitled "Preliminary Results of the Survey on the Use of Passenger Air Bag On-Off Switches", the Agency claims an overall misuse rate of ~48% for children ages 1-12 years. The report alludes to the Agency's November

1997 final rule that considers this group among the "...high-risk groups that should not be exposed to passenger air bags..." However, this presents a contrast to what is dictated by the FMVSS 208 requirements.

Section 16.1 of FMVSS 208 requires that new vehicles have a passenger air bag that will sufficiently protect a 5th percentile female in rigid barrier tests, both belted (at speeds up to 30 mph) and unbelted (at speeds from 20-25 mph). FMVSS 208 simulates the 5th percentile female (AF05) by using a Hybrid III dummy measuring 60 inches (5 feet) in height and weighing 110 lbs. Therefore, by design, an occupant of this size would receive an air bag. However, an examination of the 2000 CDC growth charts developed by the National Center for Health Statistics (see Attachment 1) shows that many children under the age of 12 could be of the aforementioned AF05 stature. For boys, just over 40% of 12 year-olds are taller than 60 inches and ~20% weigh more than 110 pounds. Similarly for girls, almost 20% of 12 year-olds exceed the stature and weight of the AF05. As you examine boys and girls of ages 10 and 11, the higher percentiles of these age groups also exceed the AF05 stature. Therefore, by design, it is possible for a 10, 11 or 12 year-old to get an air bag deployment, as required by FMVSS 208. The Agency's report further notes in Table 4 that for 11-12 years old, misuse, defined as "airbag on when it should be off", was observed 66% of the time. However, as previously stated, the air bag would be "on" as a result of designing to the requirements of FMVSS 208.

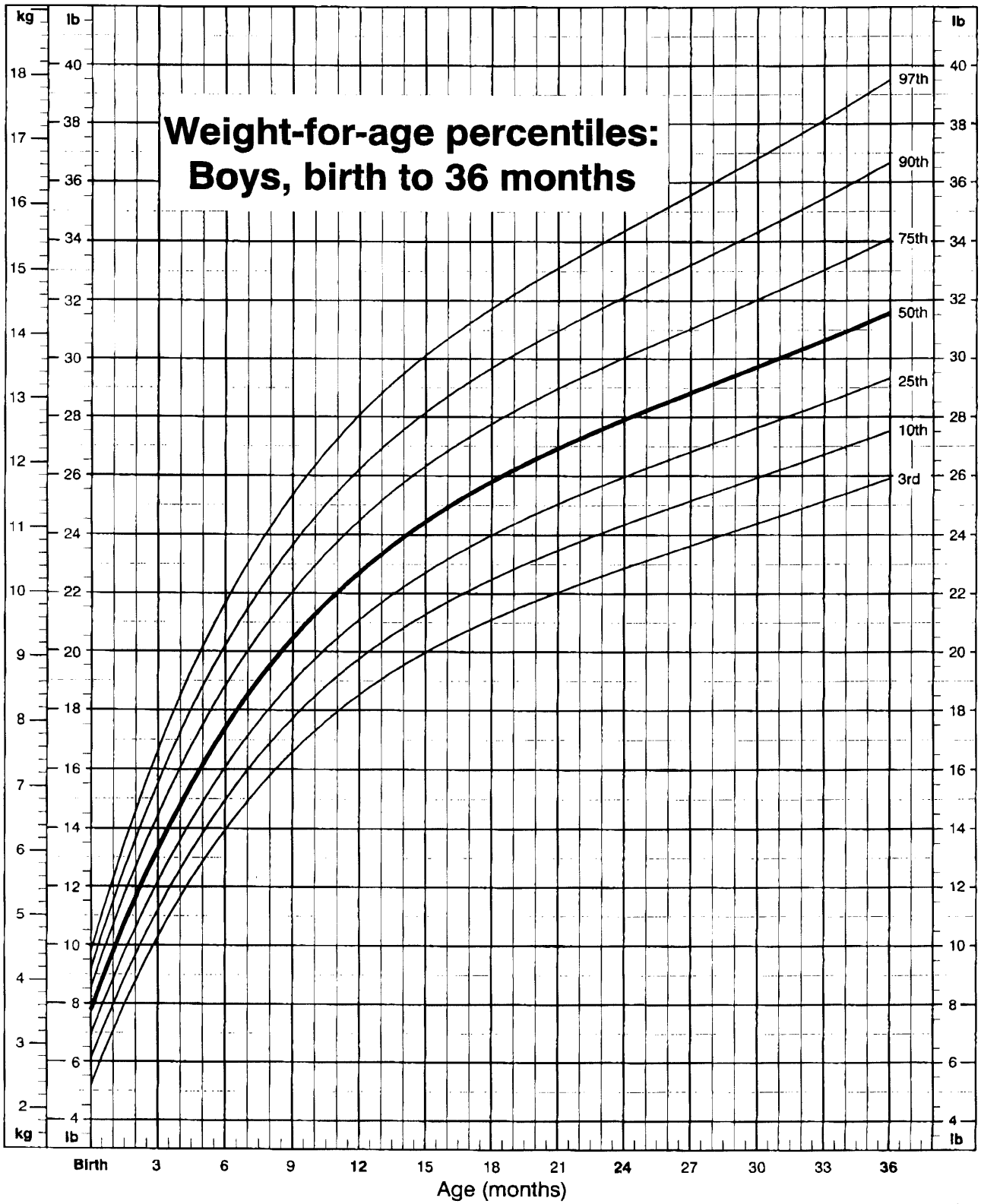
As previously described, there is also a concern with the capabilities of OCS systems, and the system variance, or gray zones. Although the system may be able to detect an AF05 dummy, in the real world actual humans may register smaller stature readings, which could fall into gray zones. In this case, small females shorter than 60 inches and weighing less than 110 lbs. could get an airbag. Consequently, upon consultation of the CDC growth charts, this could also apply to some 7- 9 year-old children. Therefore, system limitations also cause a concern when being designed to the requirements of FMVSS 208.

Therefore, first, we feel that the conclusions drawn in the paper contradict the direction of the Agency's rule, since FMVSS 208 requires an air bag be deployed in some cases denoted as "misuse". Restated, assuming OCS had no gray zones and was 100% reliable (i.e. acted like a light switch), "by design" not only would these systems suppress the bag for the 6 year-old and turn it on for the 5th percentile female, but could also turn the bag on for some 10-12 year-olds - which is clearly labeled "misuse" by the Agency.

Given the complex nature of occupant classification, coupled with the substantial overlap in the small female vs. child populations, it is not possible for current occupant classification systems to accurately discern between the two populations and design air bags within the requirements of FMVSS 208. Therefore, first, we agree with the report conclusion that, "NHTSA and its partners must increase efforts to educate the public on the dangers of air bags to toddlers and pre-teens..." which includes children under 13 years of age. And finally, we request allowance of the 3-Way Manual Override Switch as a necessary redundancy to insure protection of all occupants.

ATTACHMENT I

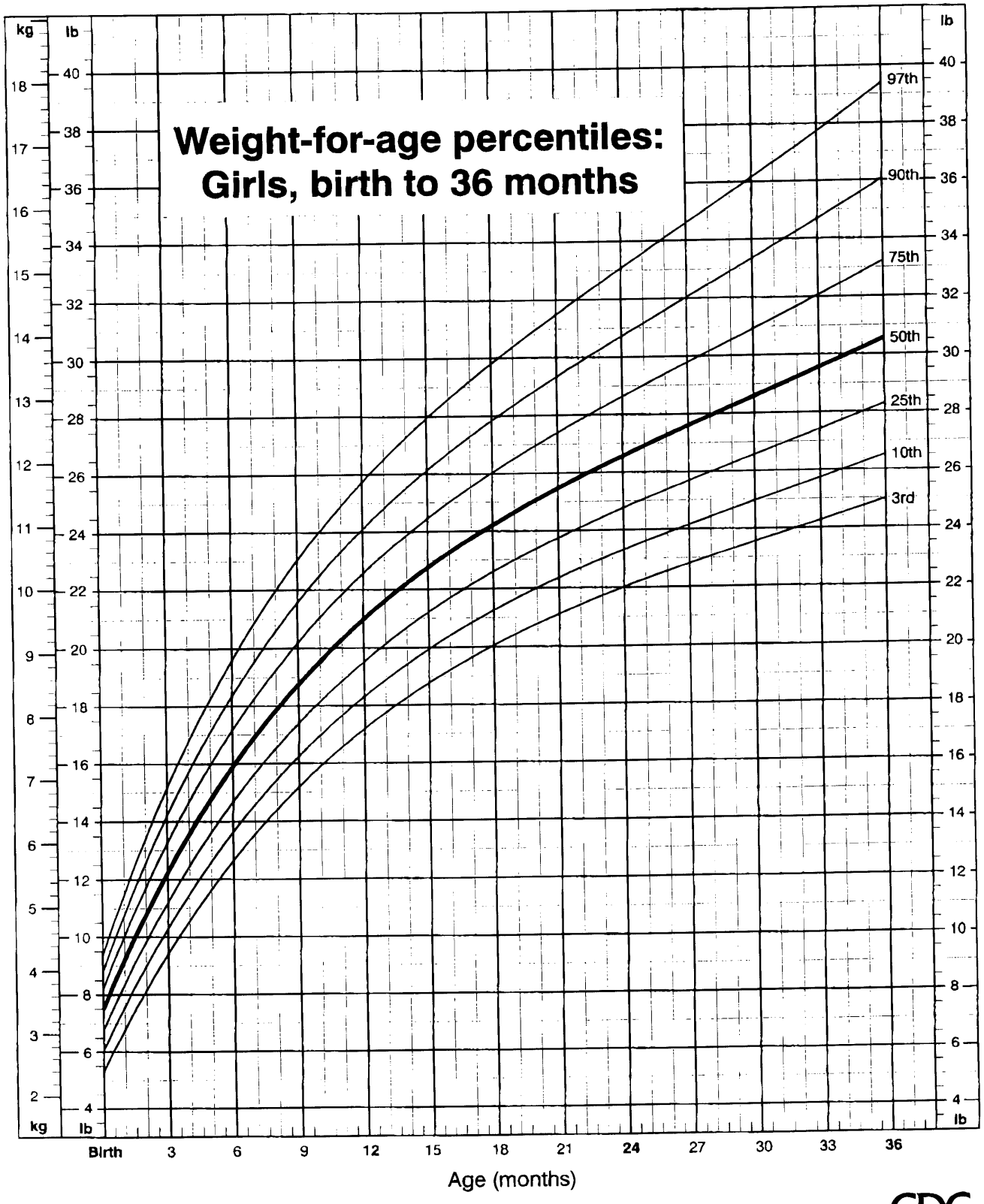
CDC Growth Charts: United States



SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

CDC

CDC Growth Charts: United States



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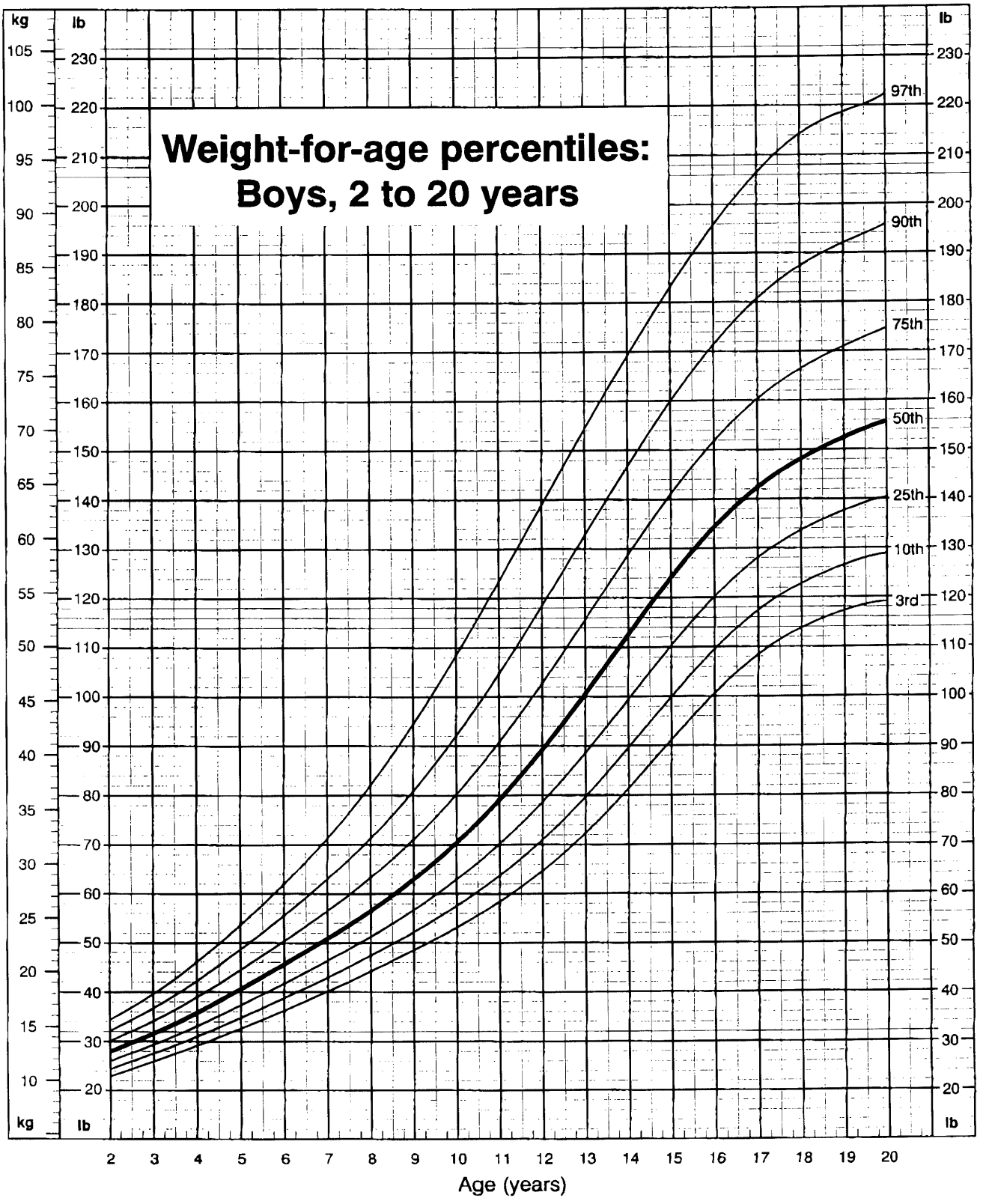

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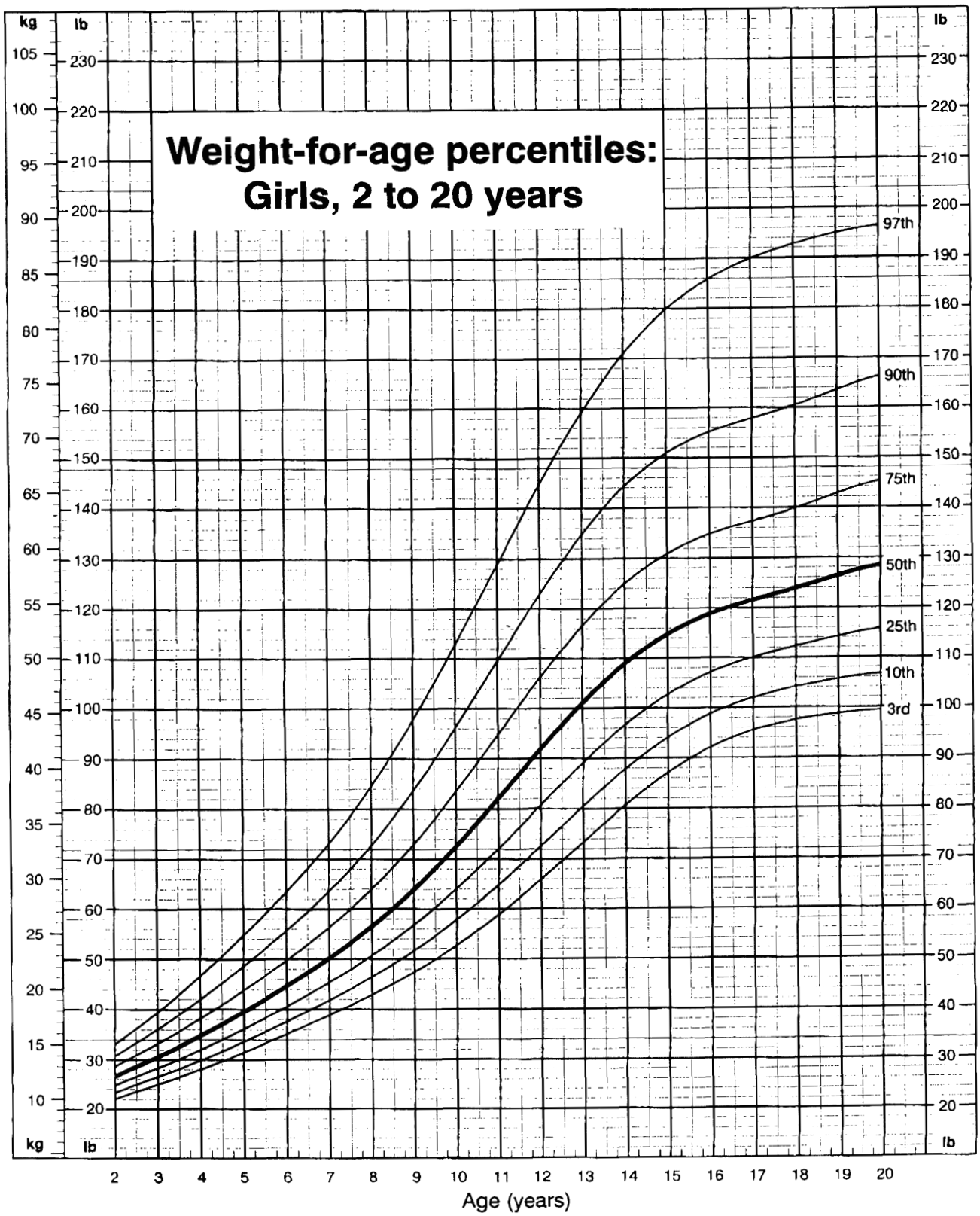

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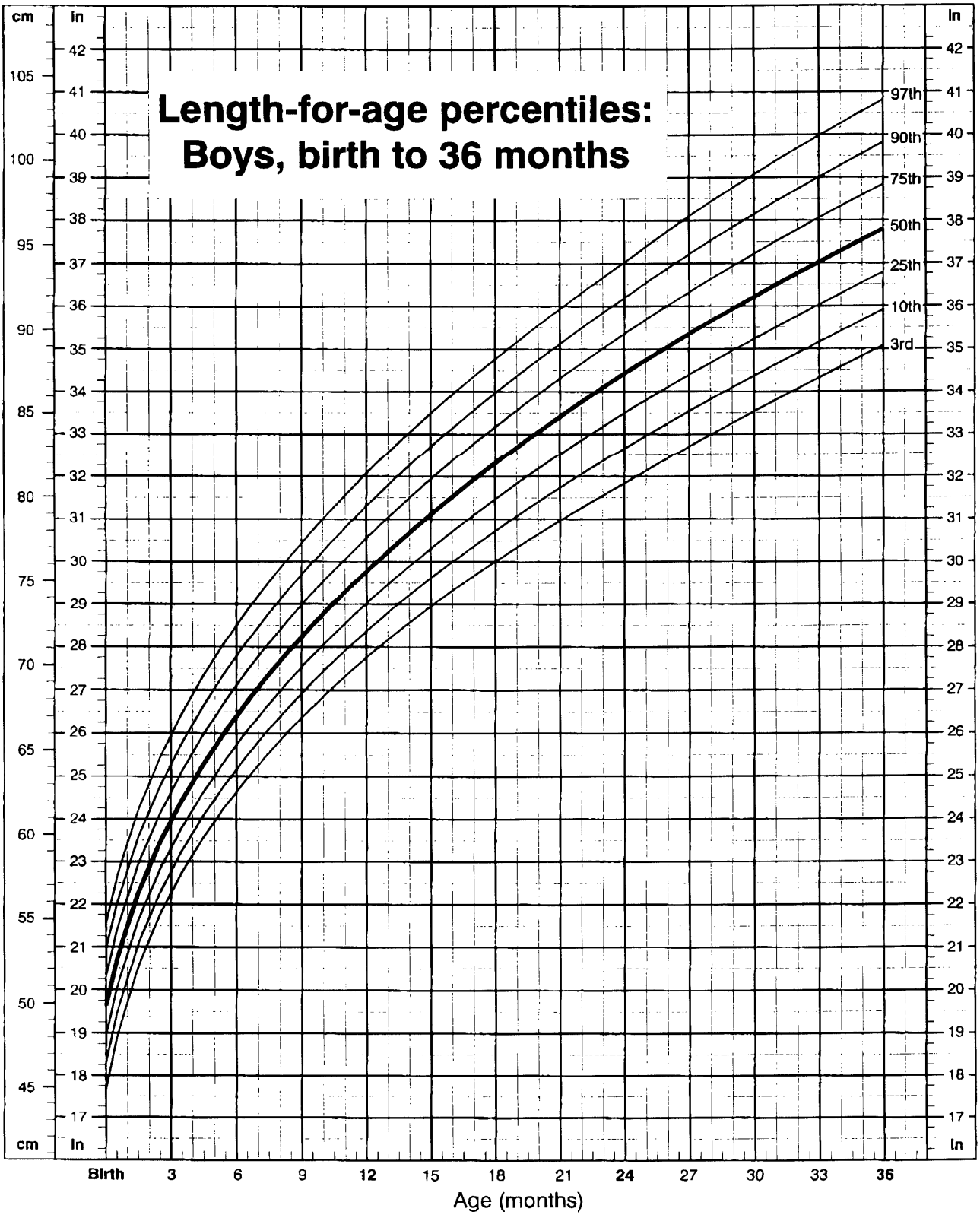

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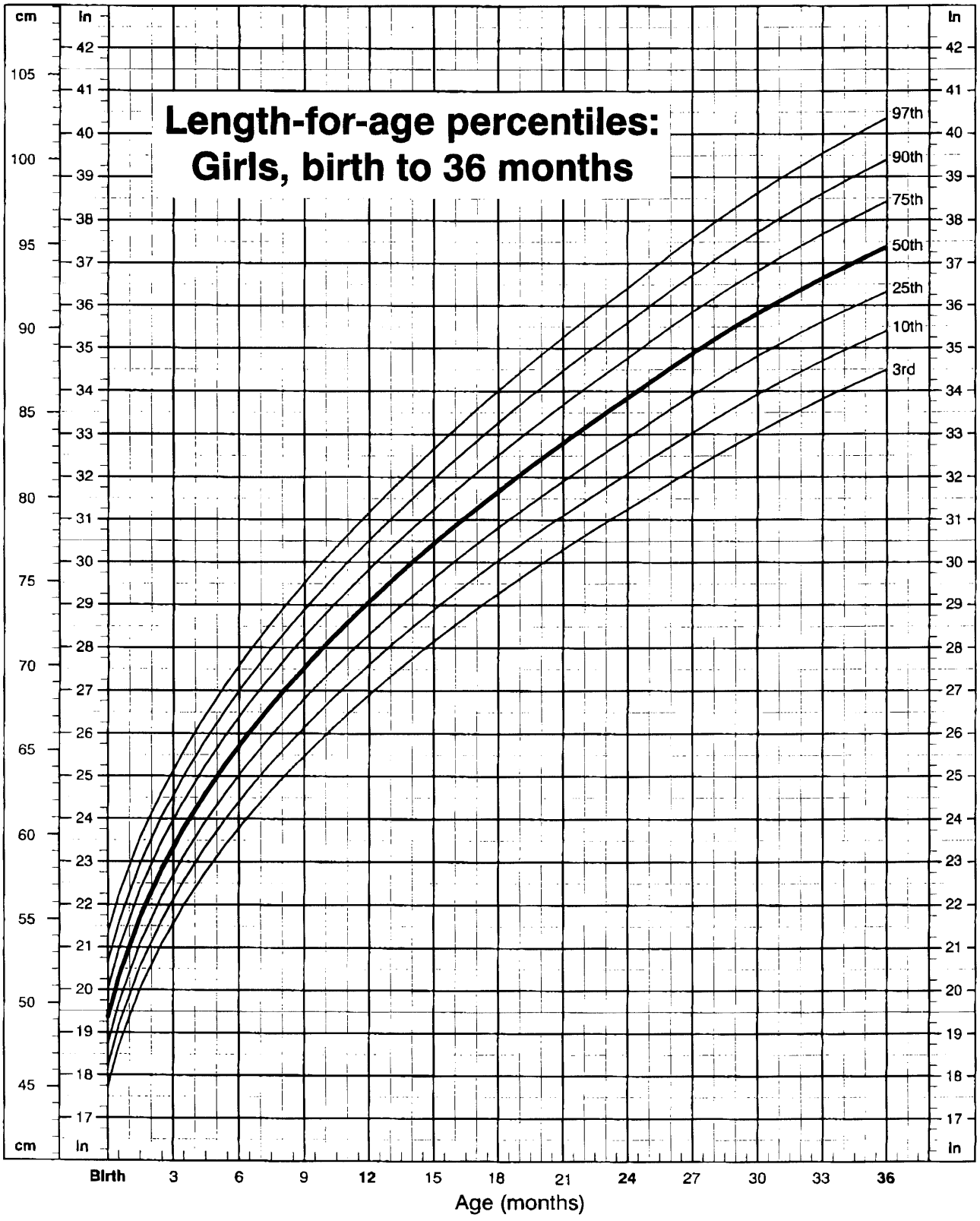

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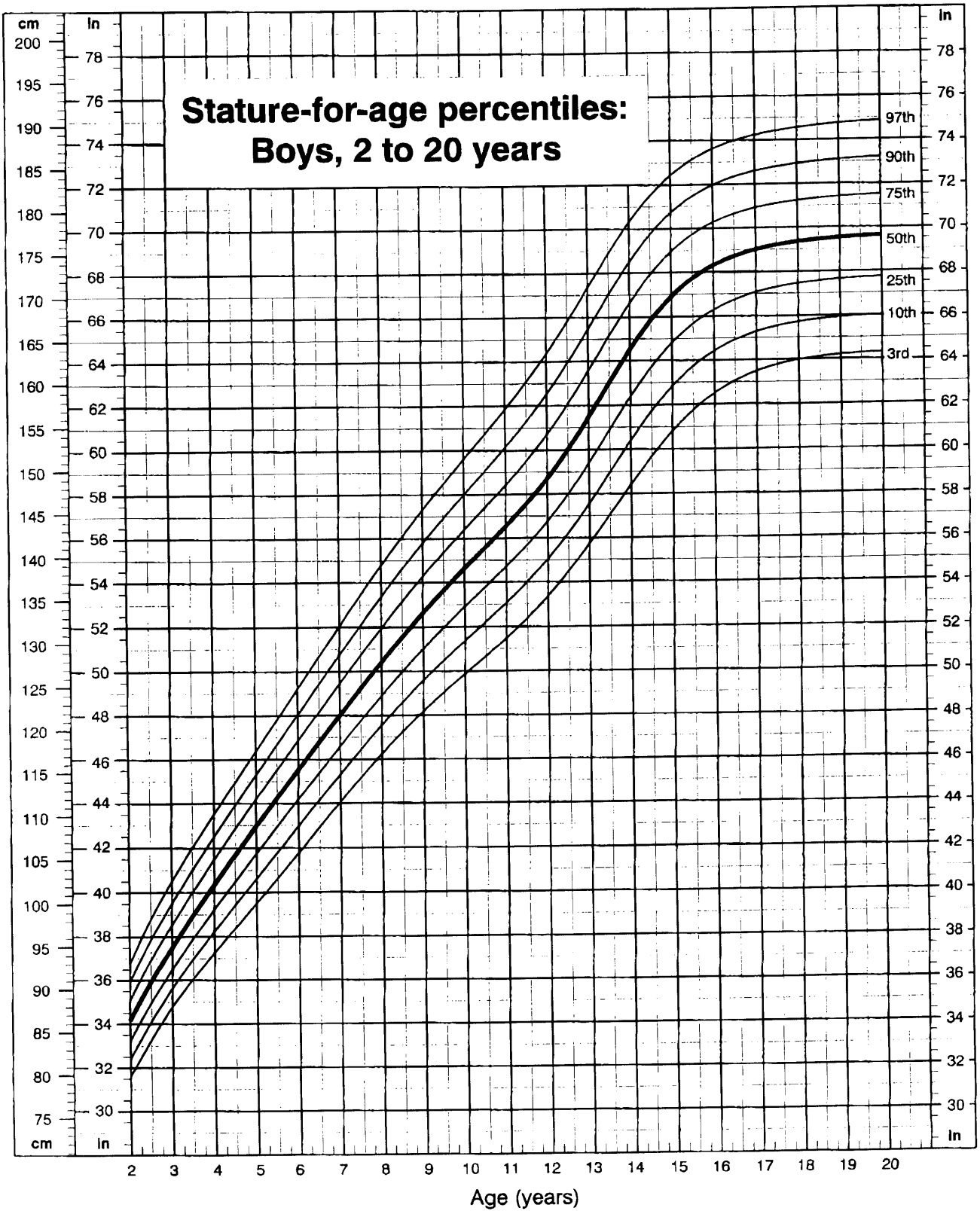

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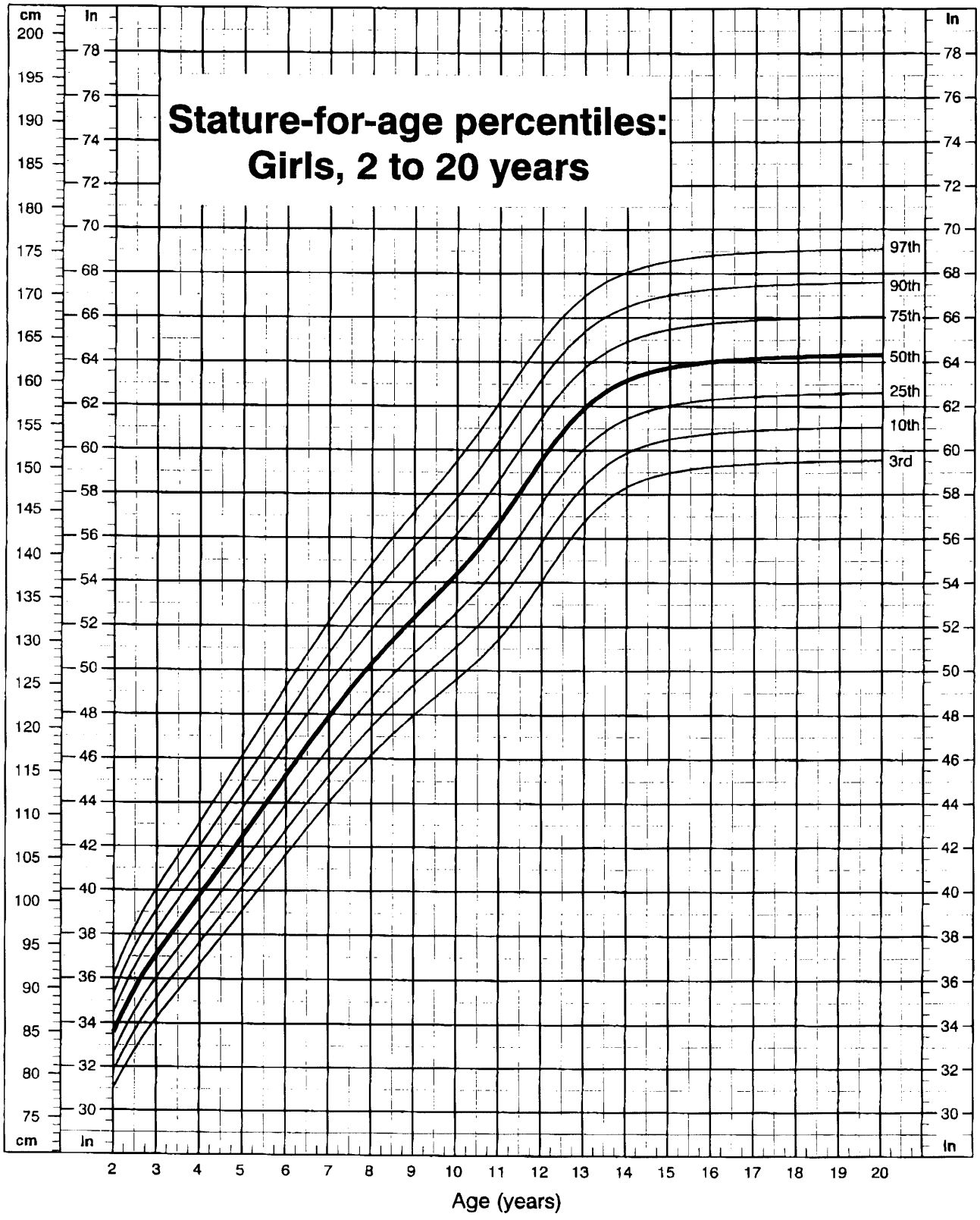

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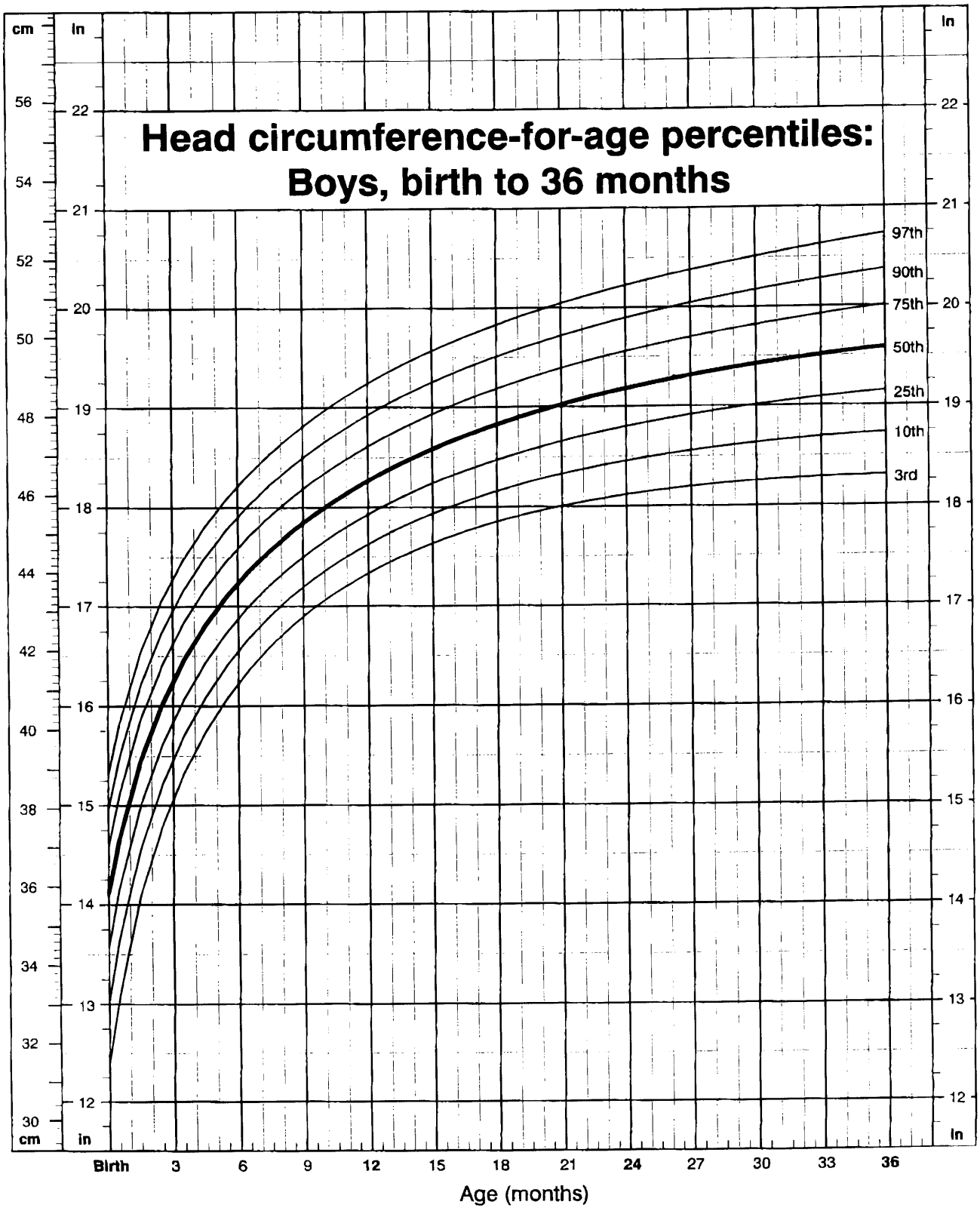

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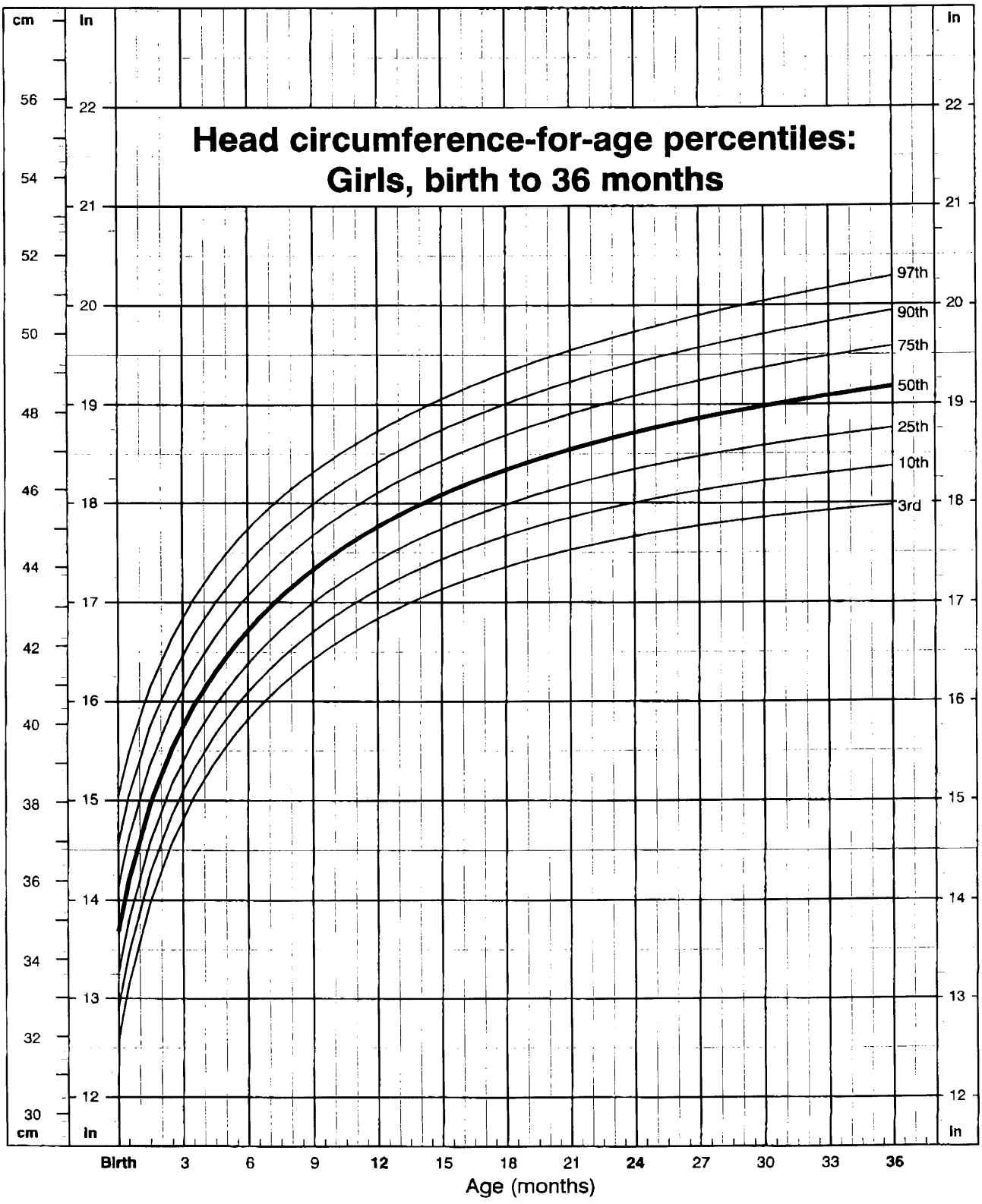

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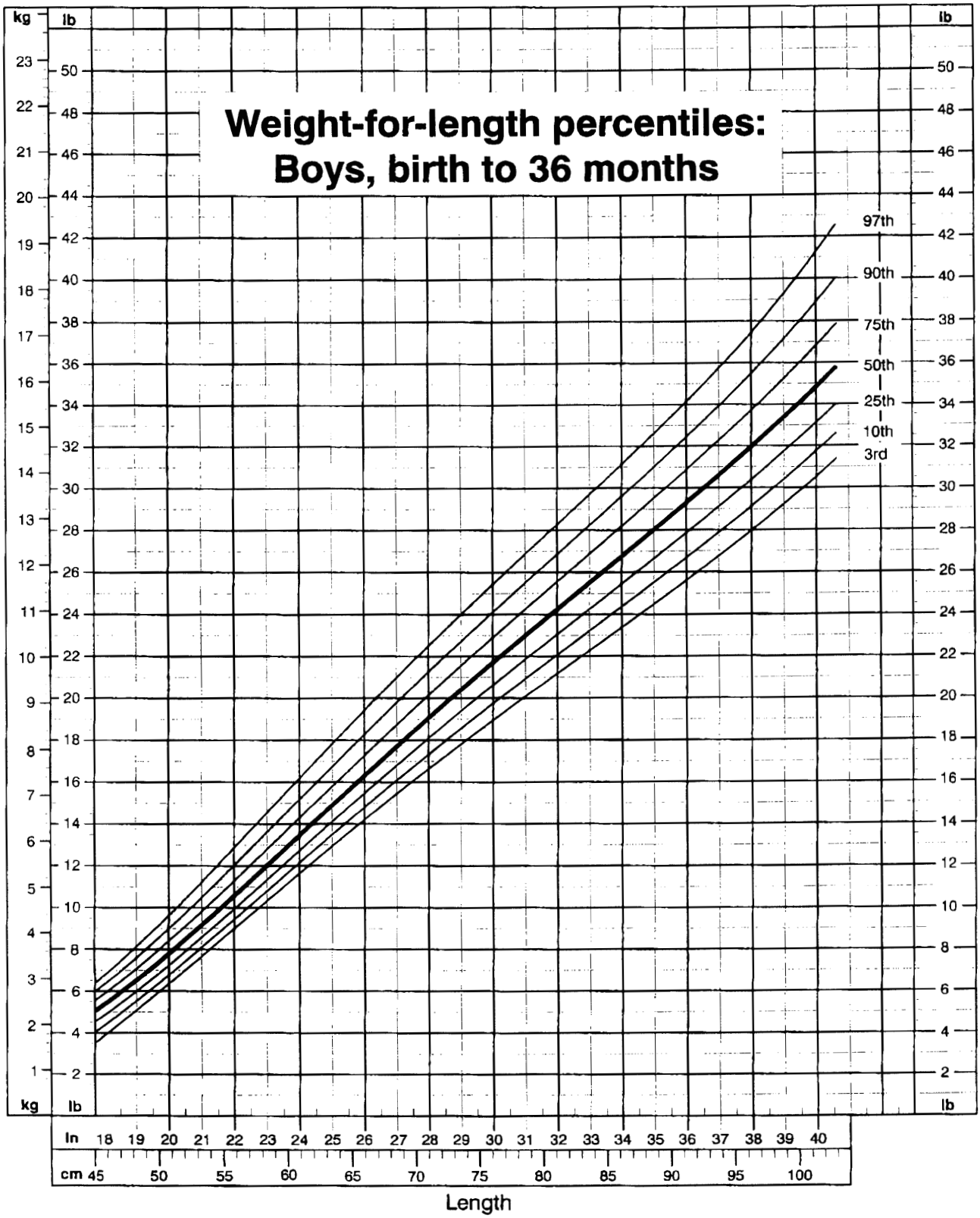

Revised and corrected June 8, 2000.

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

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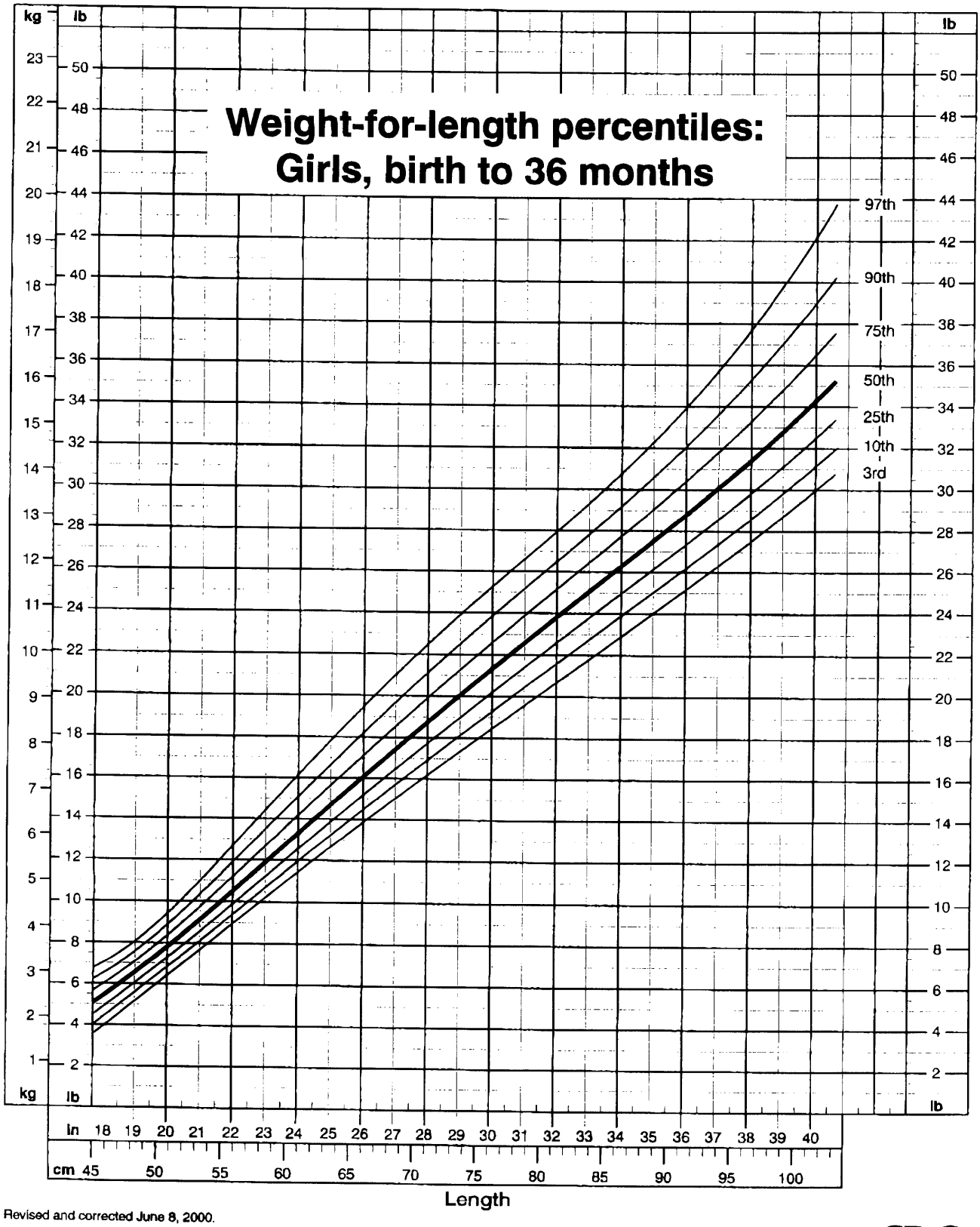

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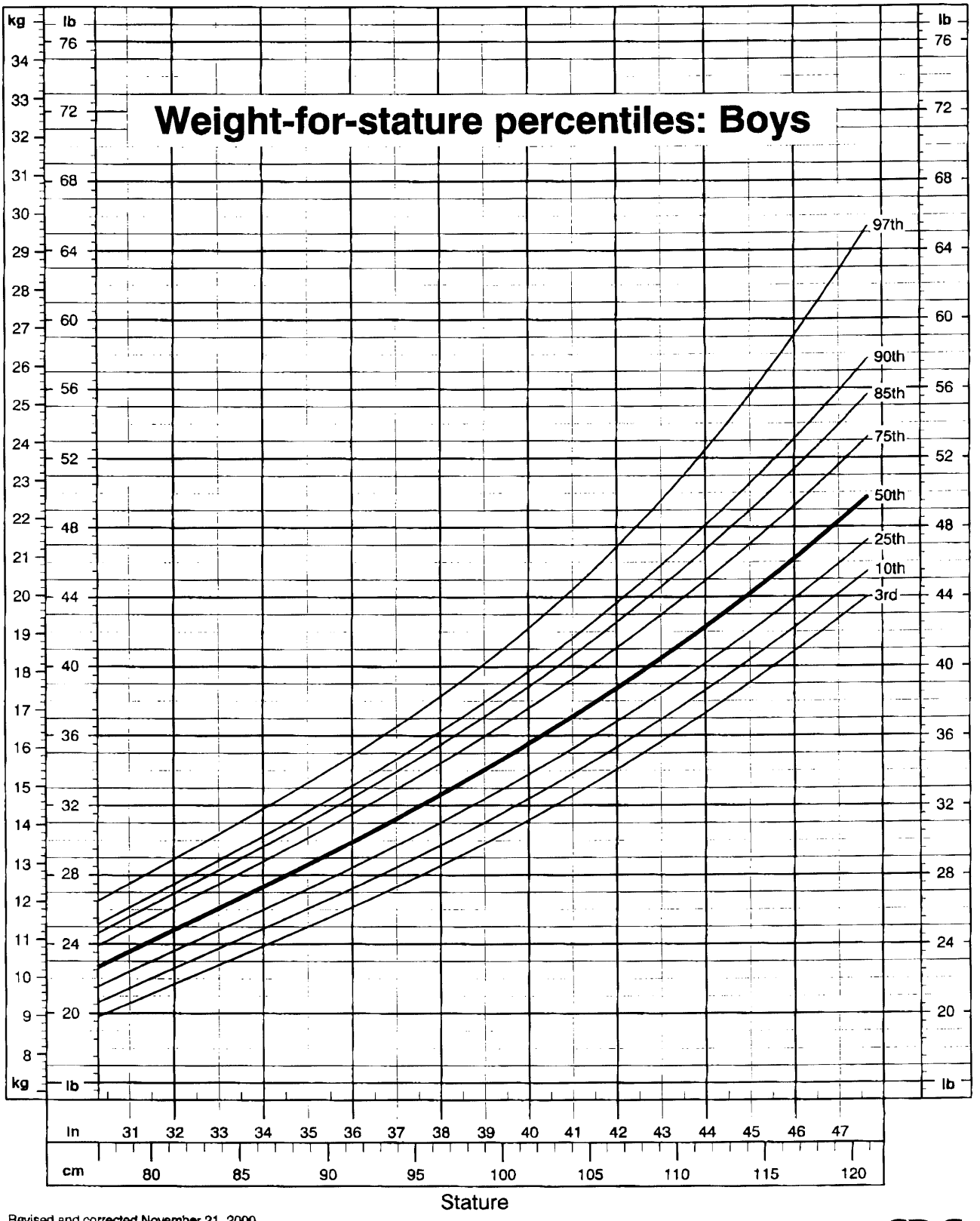

Revised and corrected November 21, 2000.

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

CDC

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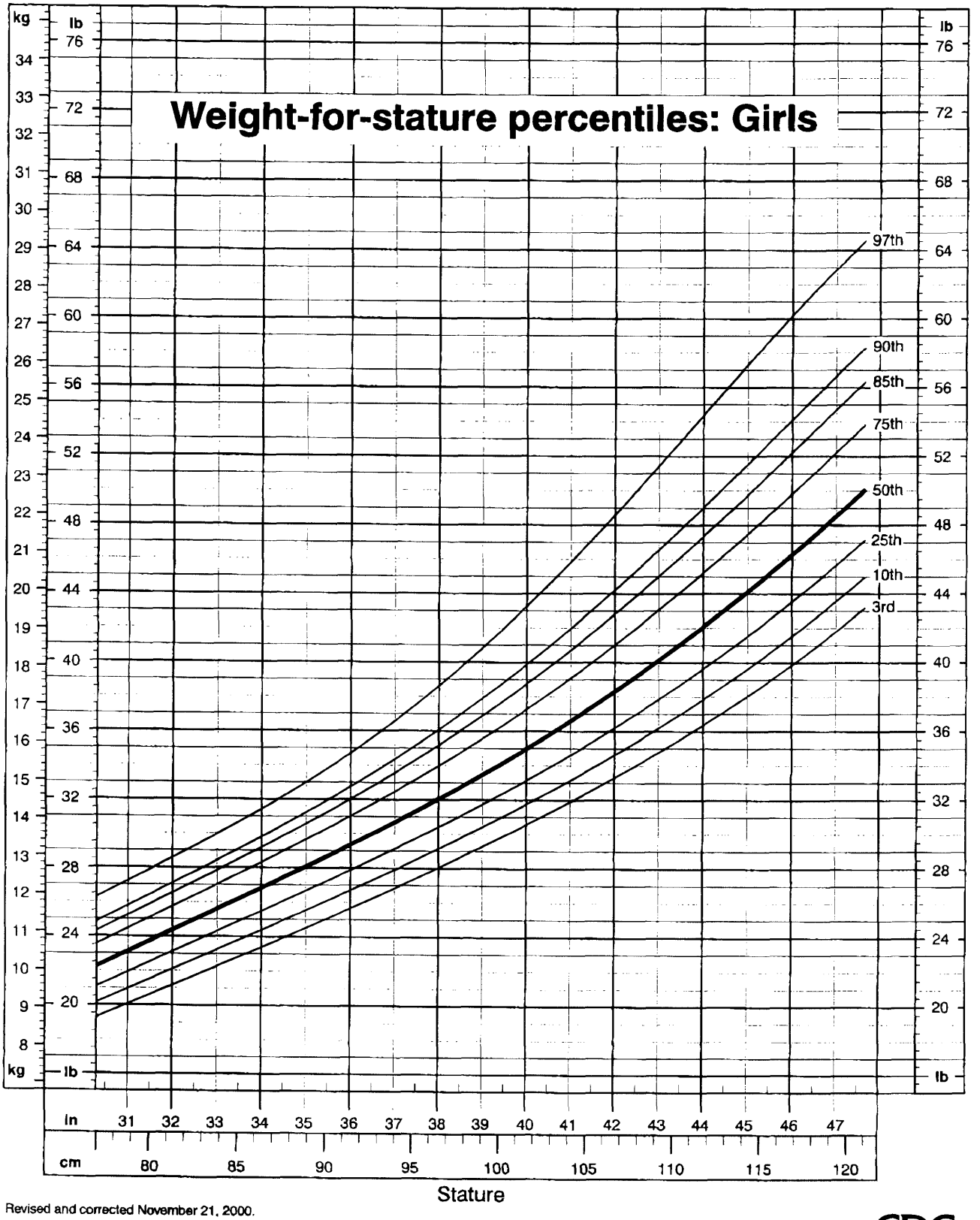

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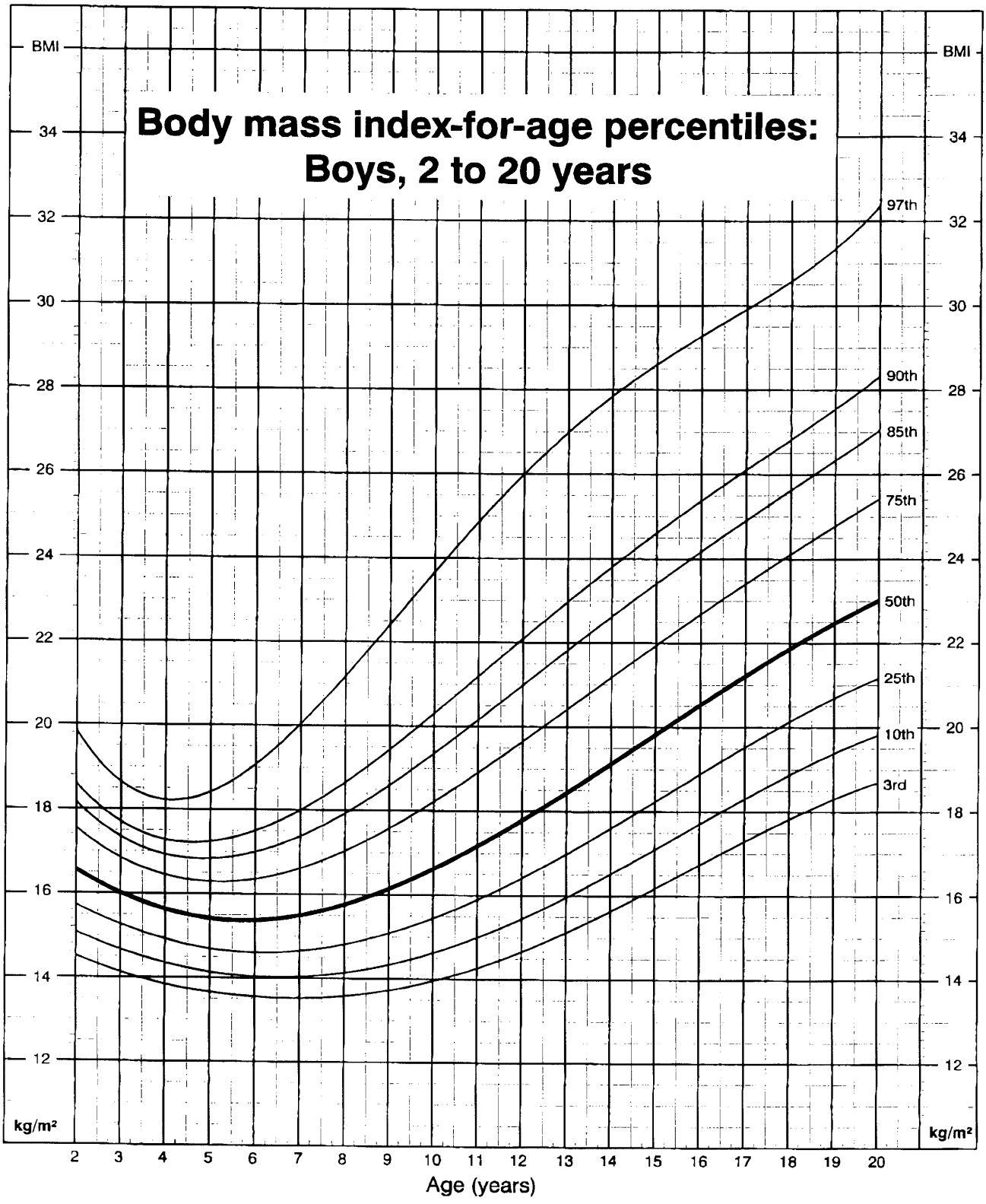

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CDC

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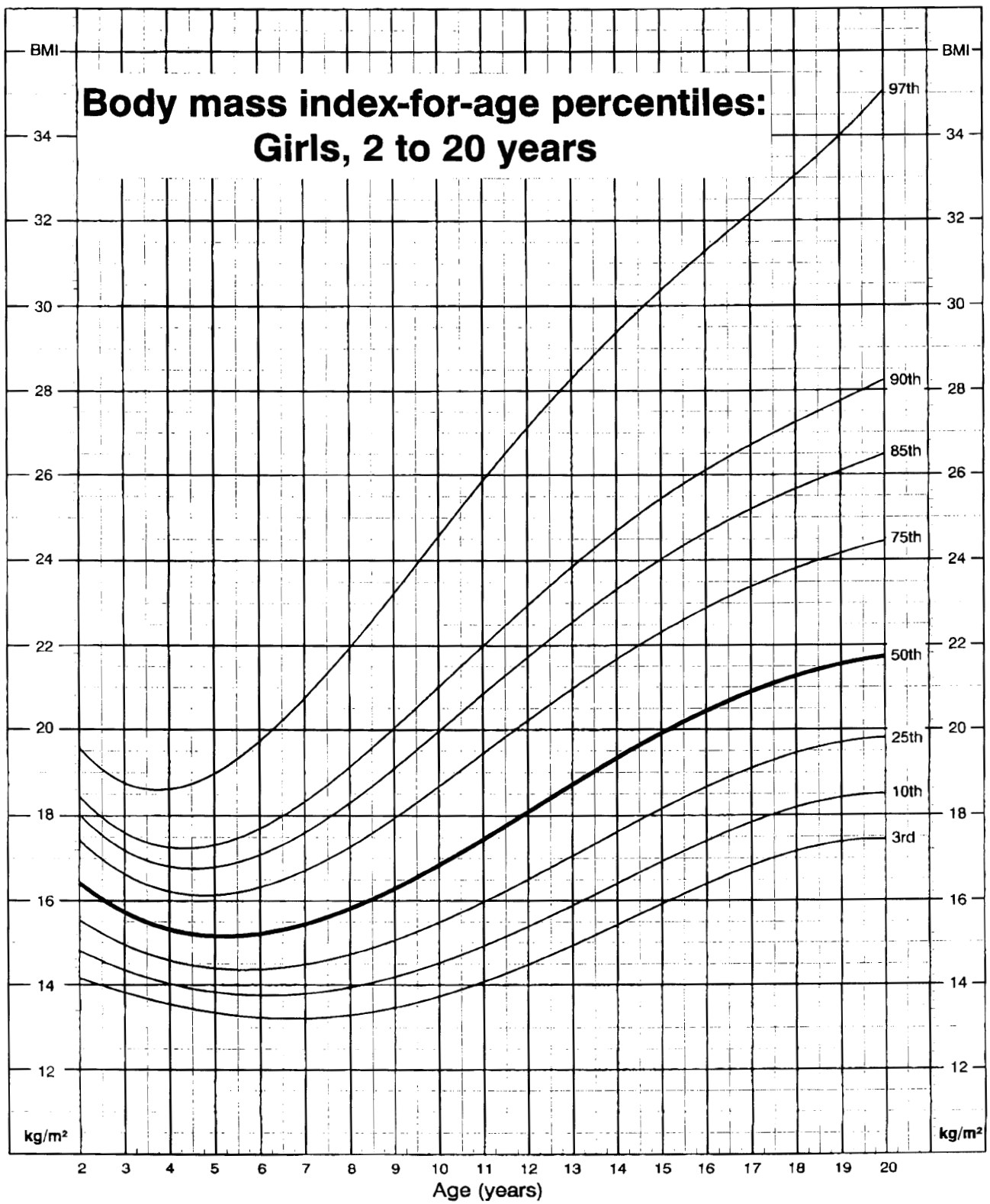
CC: Steven Kratzke & Robert Shelton

FROM: Melissa Hoffman

DATE: 10/17/2001

Comments: Hard copy to follow when packages are being accepted again

CDC Growth Charts: United States



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